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(54) **MODIFIED DOOR HINGE COMPRISING
LOCKING MECHANISM**

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(51) **Int. Cl.**
E05D 11/10 (2006.01)
E05D 3/02 (2006.01)

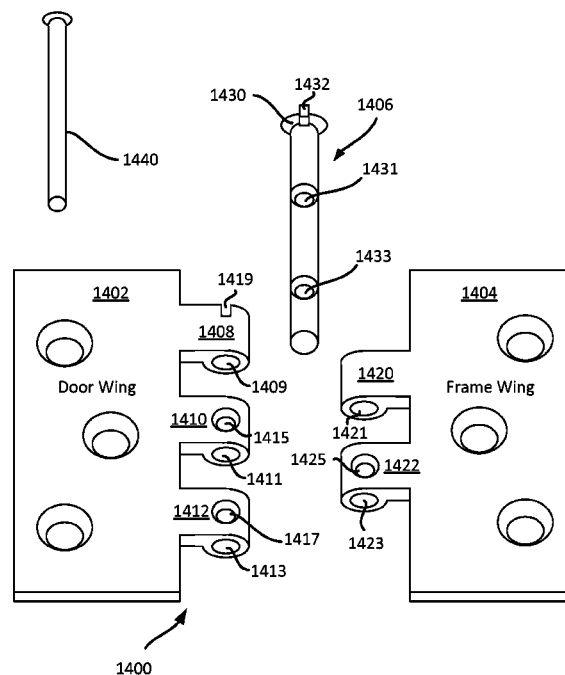
(52) **U.S. Cl.**
CPC **E05D 11/1007** (2013.01); **E05D 3/02**
(2013.01)

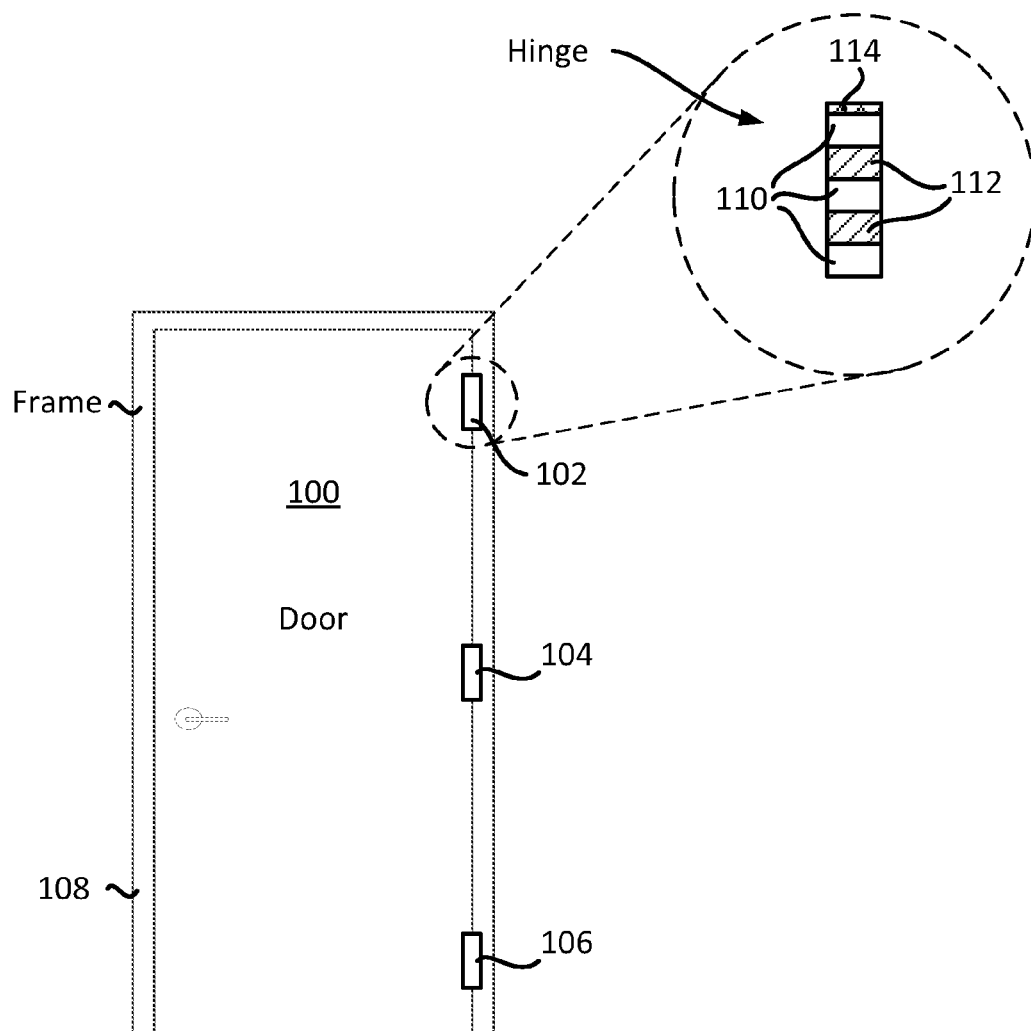
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CPC E05D 11/06; E05D 11/10; E05D 11/1007;
E05D 11/1014
USPC 16/319, 348, 357, 358, 374, 386, 387
See application file for complete search history.

ABSTRACT

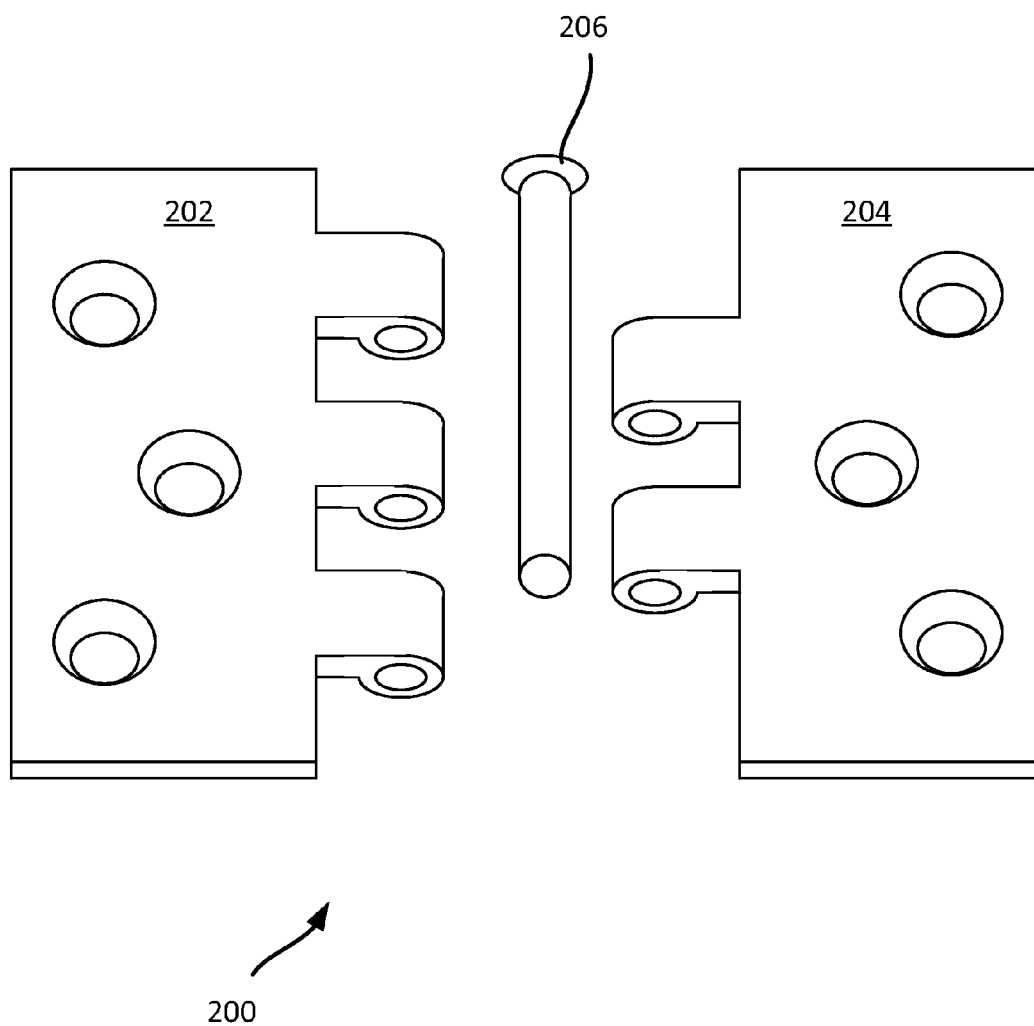
Some implementations provide a hinge that includes a first wing, a second wing, a coupling pin, and a locking pin. The first wing includes a first knuckle and a second knuckle. The first knuckle includes a first hole. The second knuckle includes a second hole and a first locking hole. The second wing includes a third knuckle and a fourth knuckle. The third knuckle includes a third hole. The fourth knuckle includes a fourth hole. The coupling pin is configured to couple the first wing to the second wing through the first, second, third and fourth knuckles. The locking pin configured to limit the hinge in a particular position when the locking pin is inserted into the first locking hole of the second knuckle. The locking pin configured to lock the hinge in a particular position when the locking pin is inserted into the locking hole of the second knuckle.

19 Claims, 18 Drawing Sheets





PRIOR ART
FIG. 1



PRIOR ART
FIG. 2

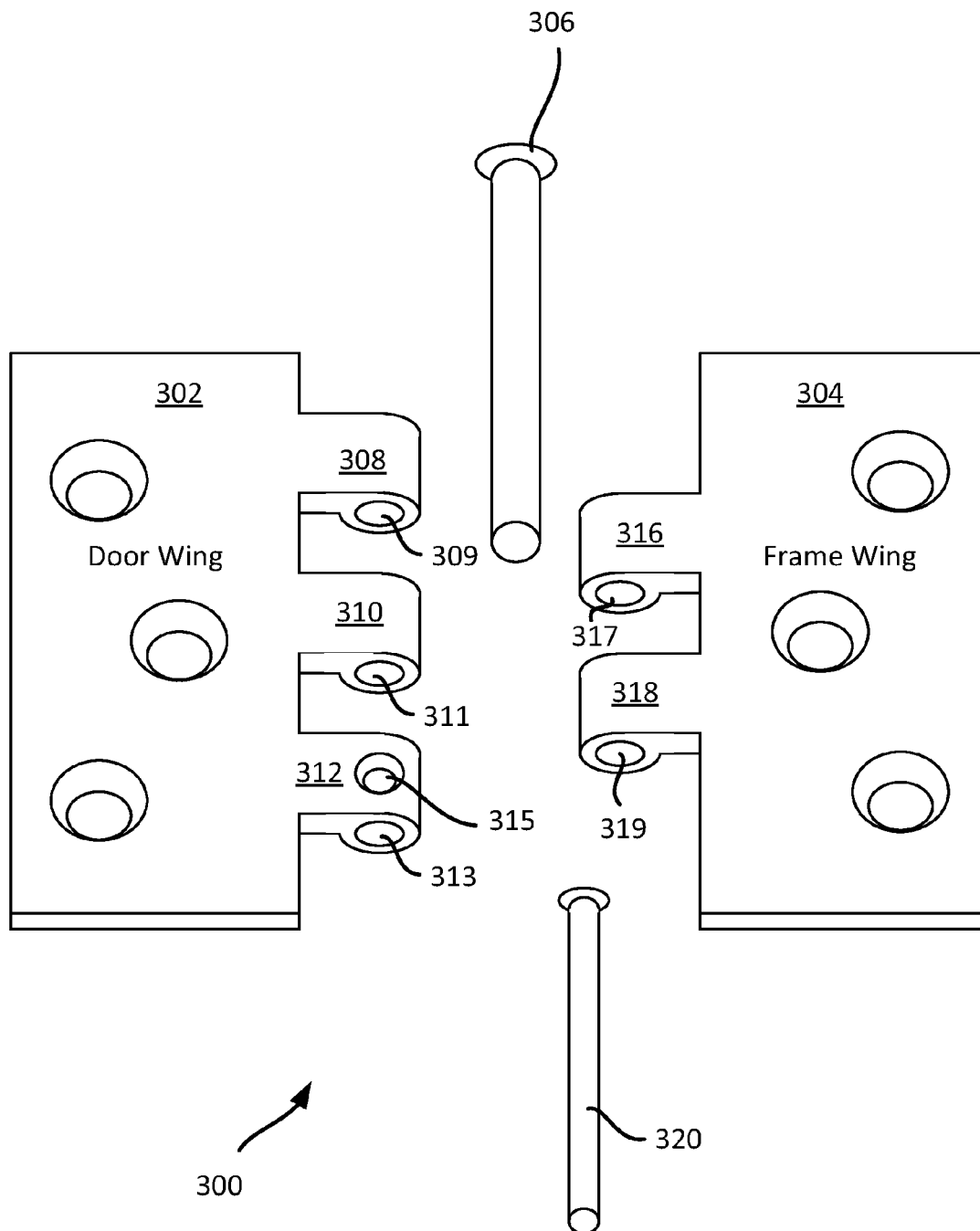


FIG. 3

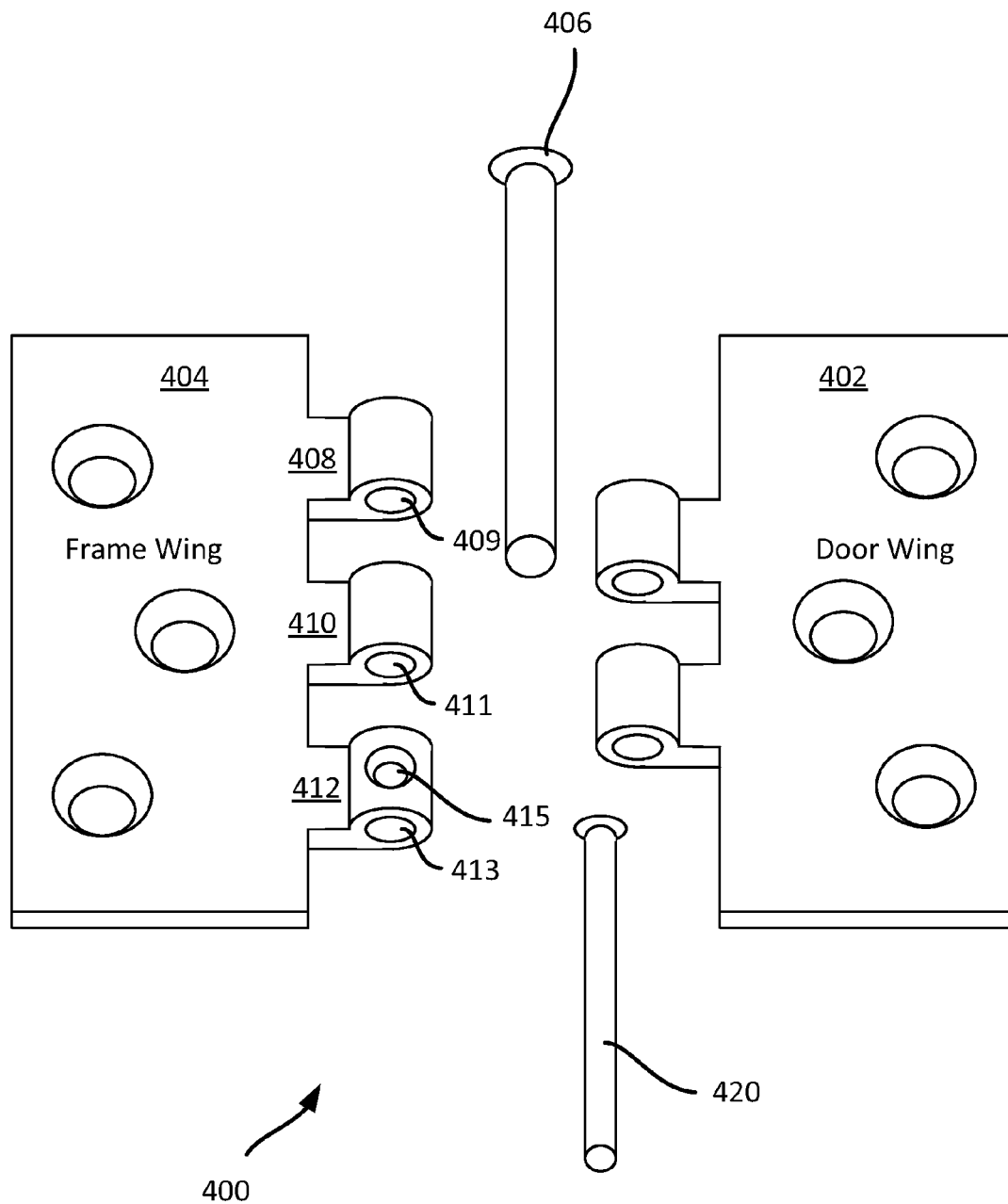


FIG. 4

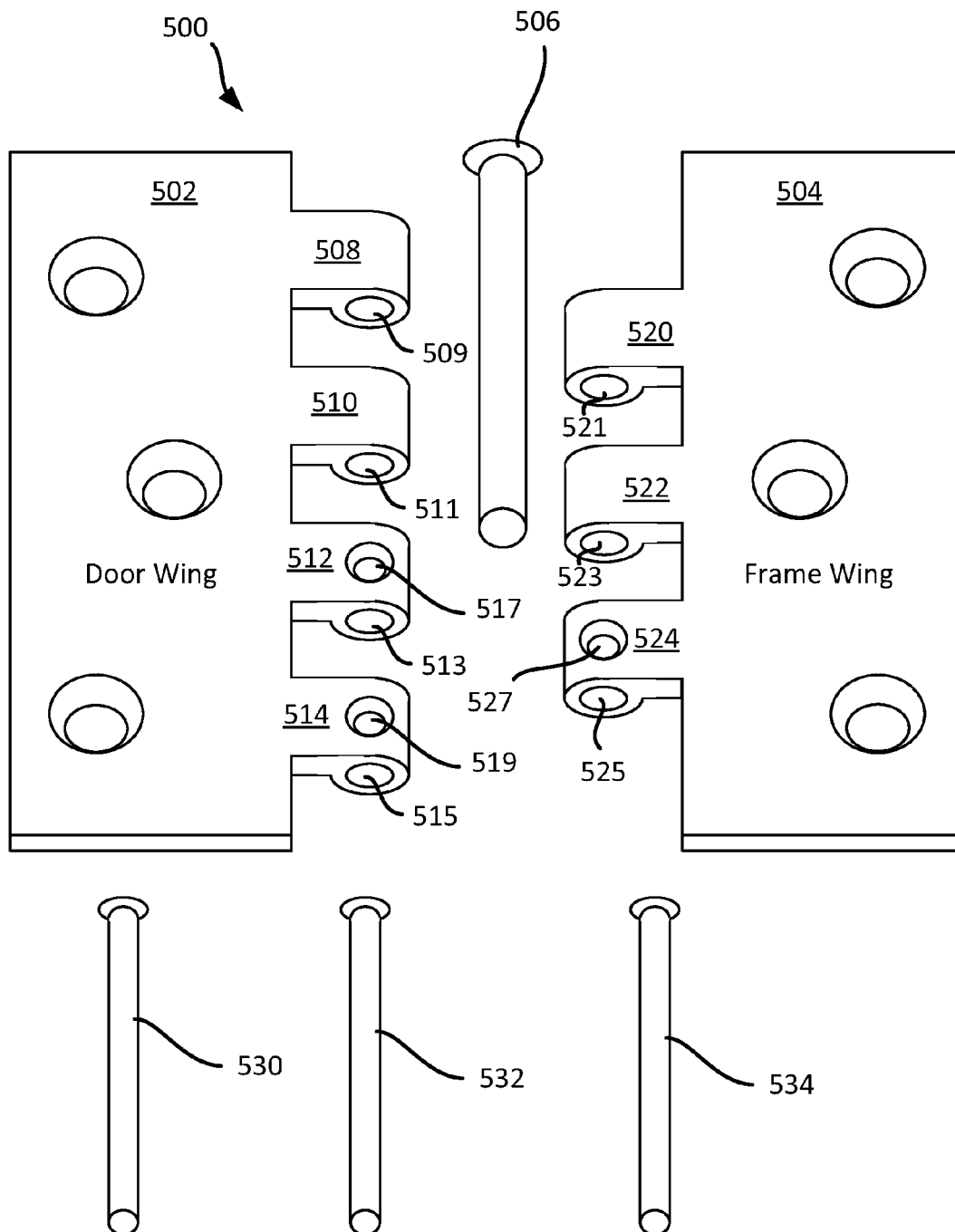


FIG. 5

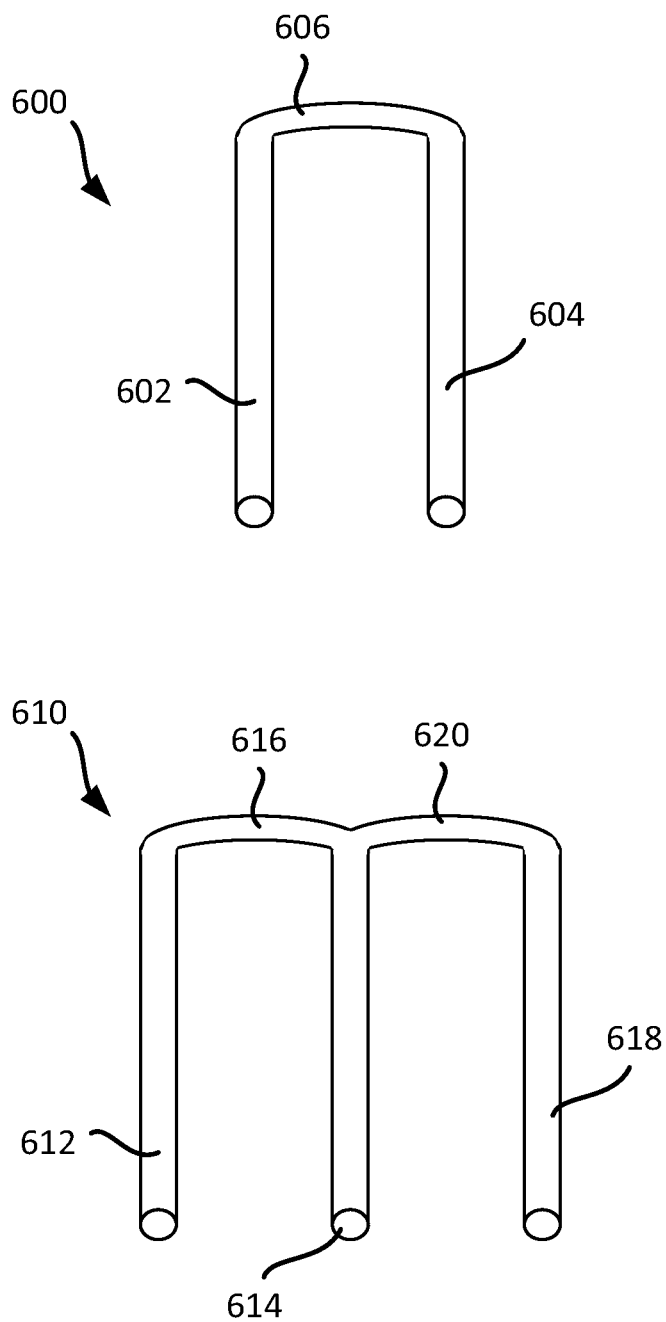


FIG. 6

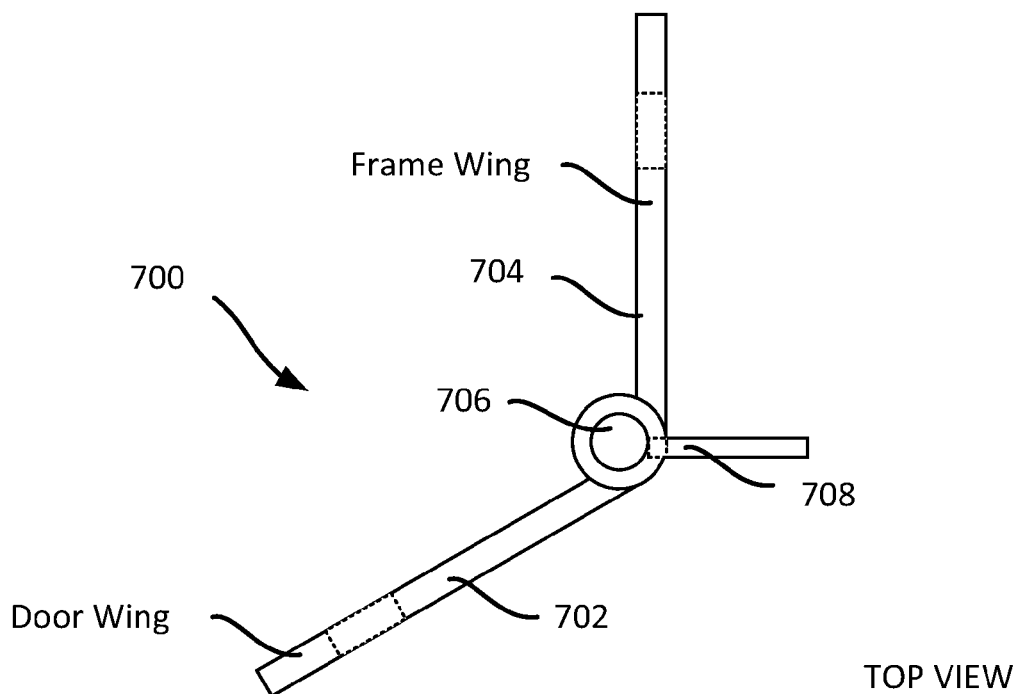


FIG. 7A

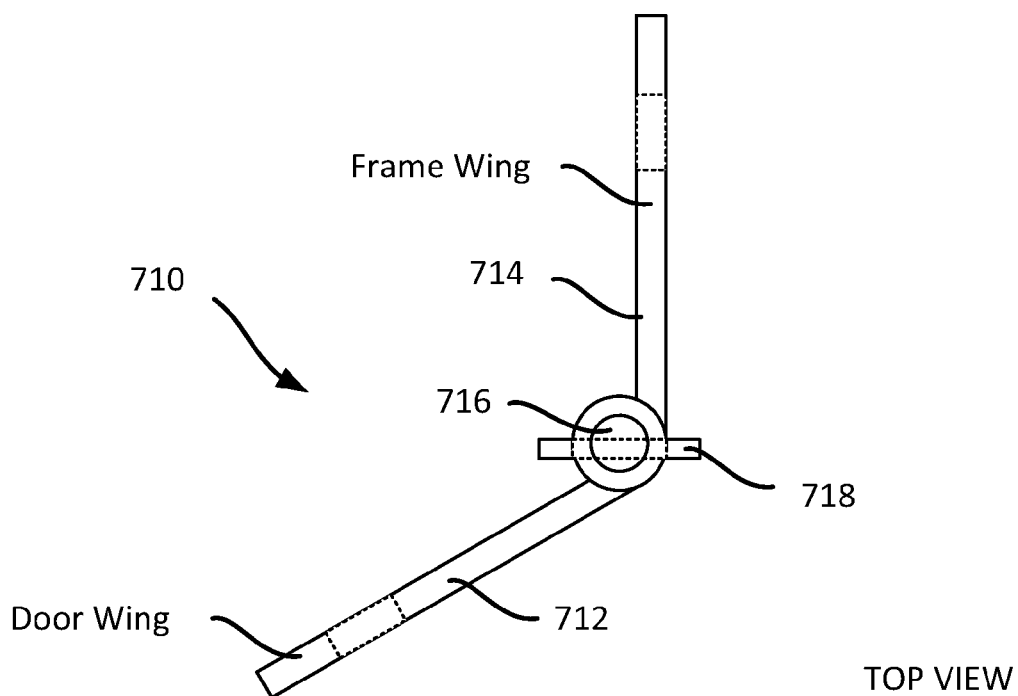
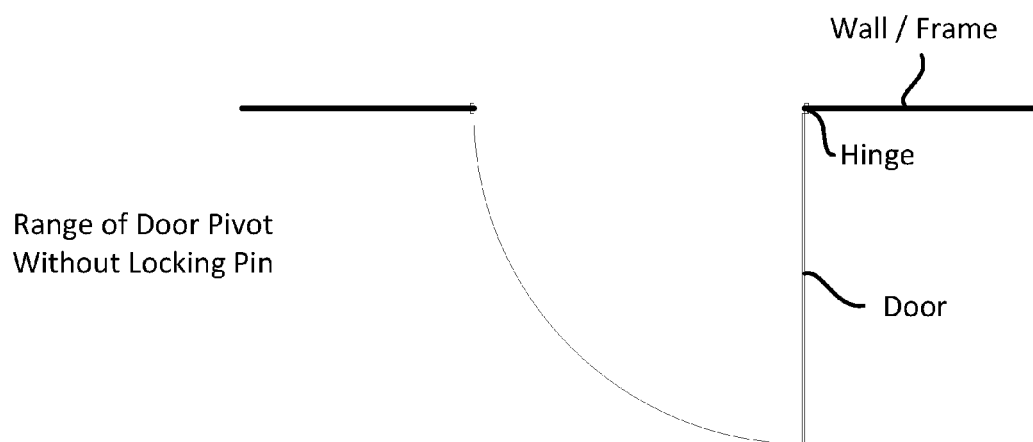
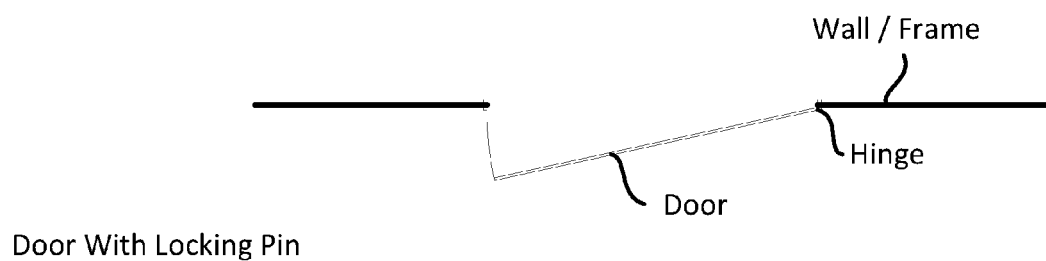


FIG. 7B

**FIG. 8A****FIG. 8B**

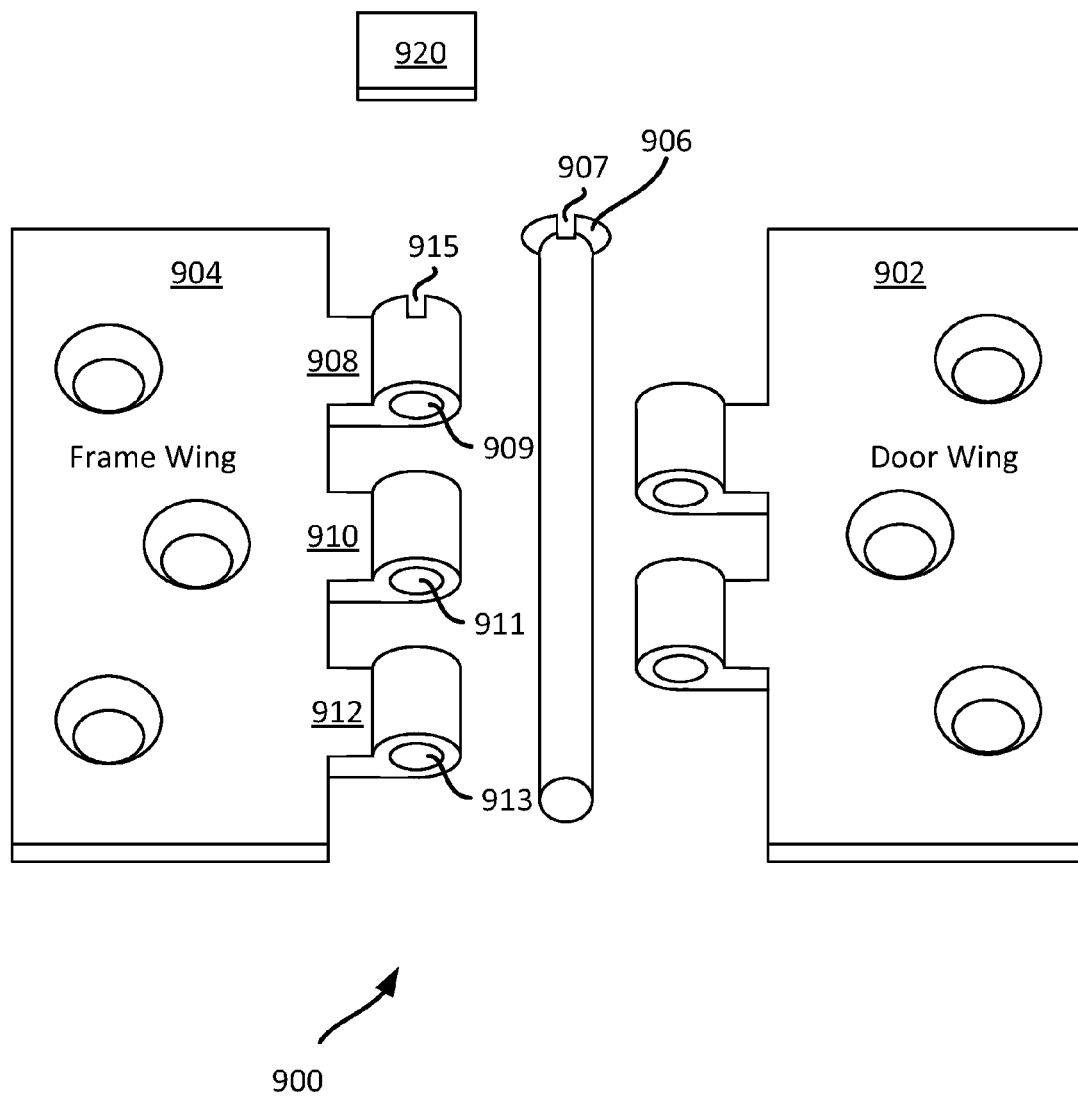


FIG. 9

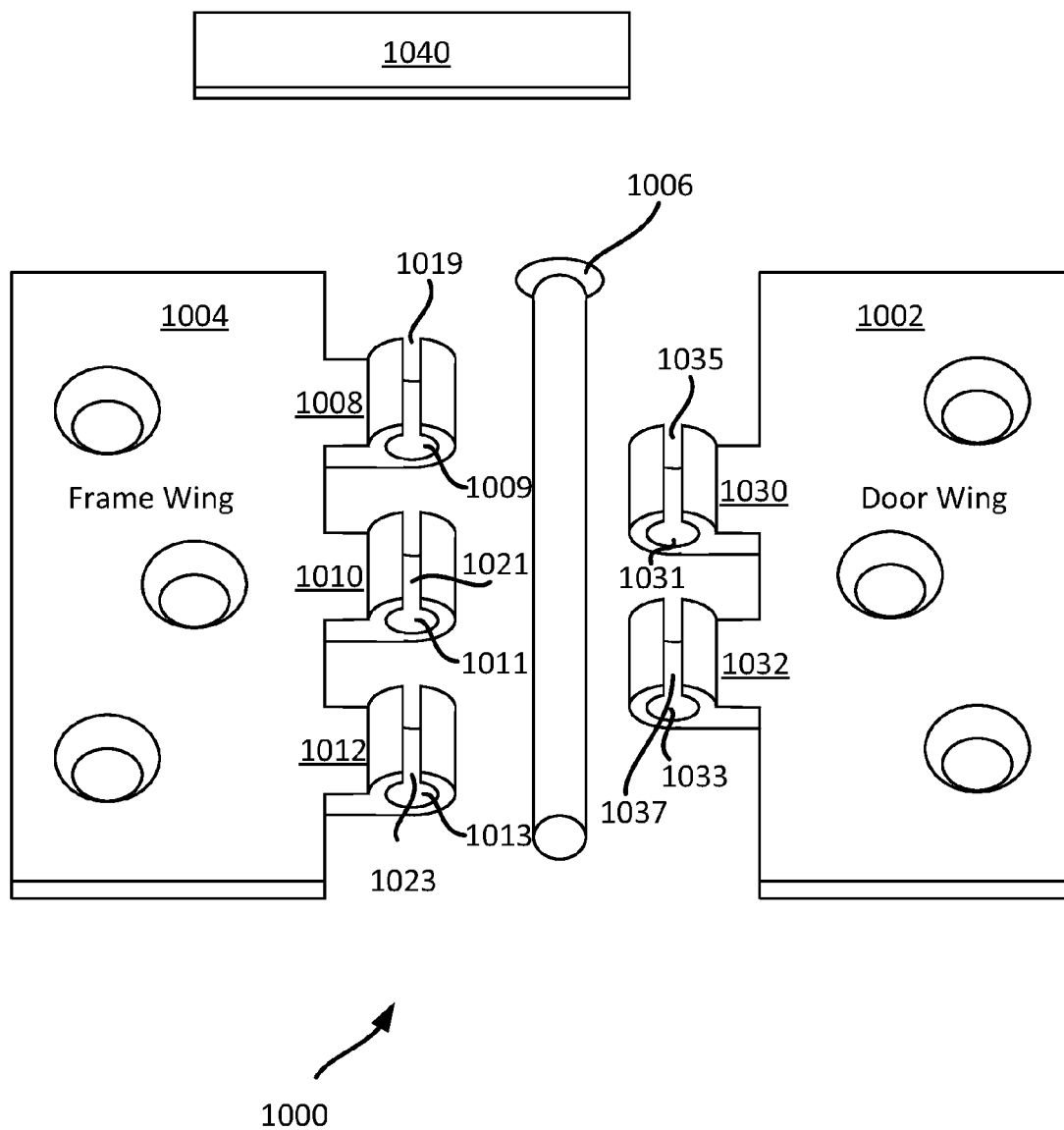


FIG. 10

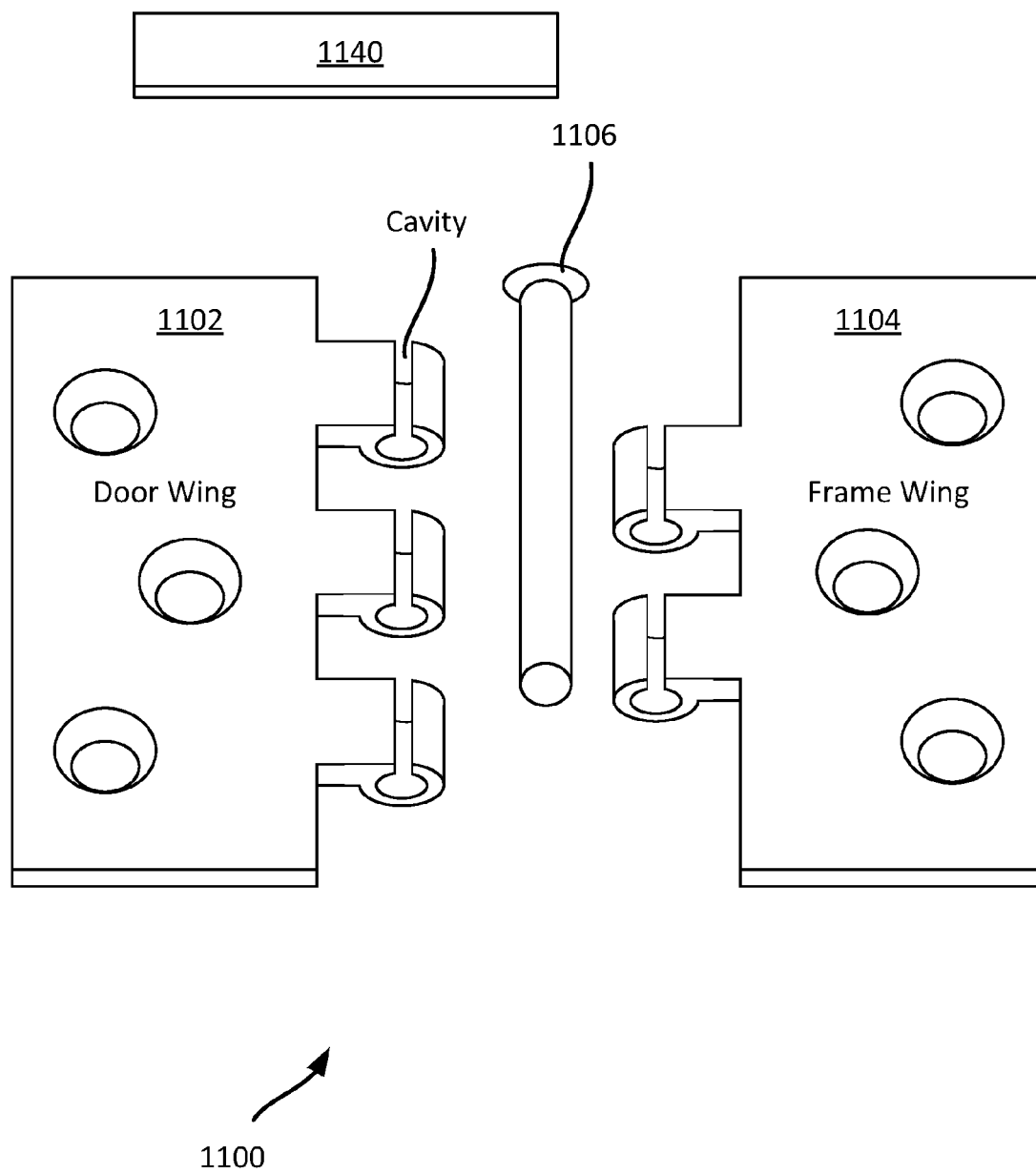


FIG. 11A

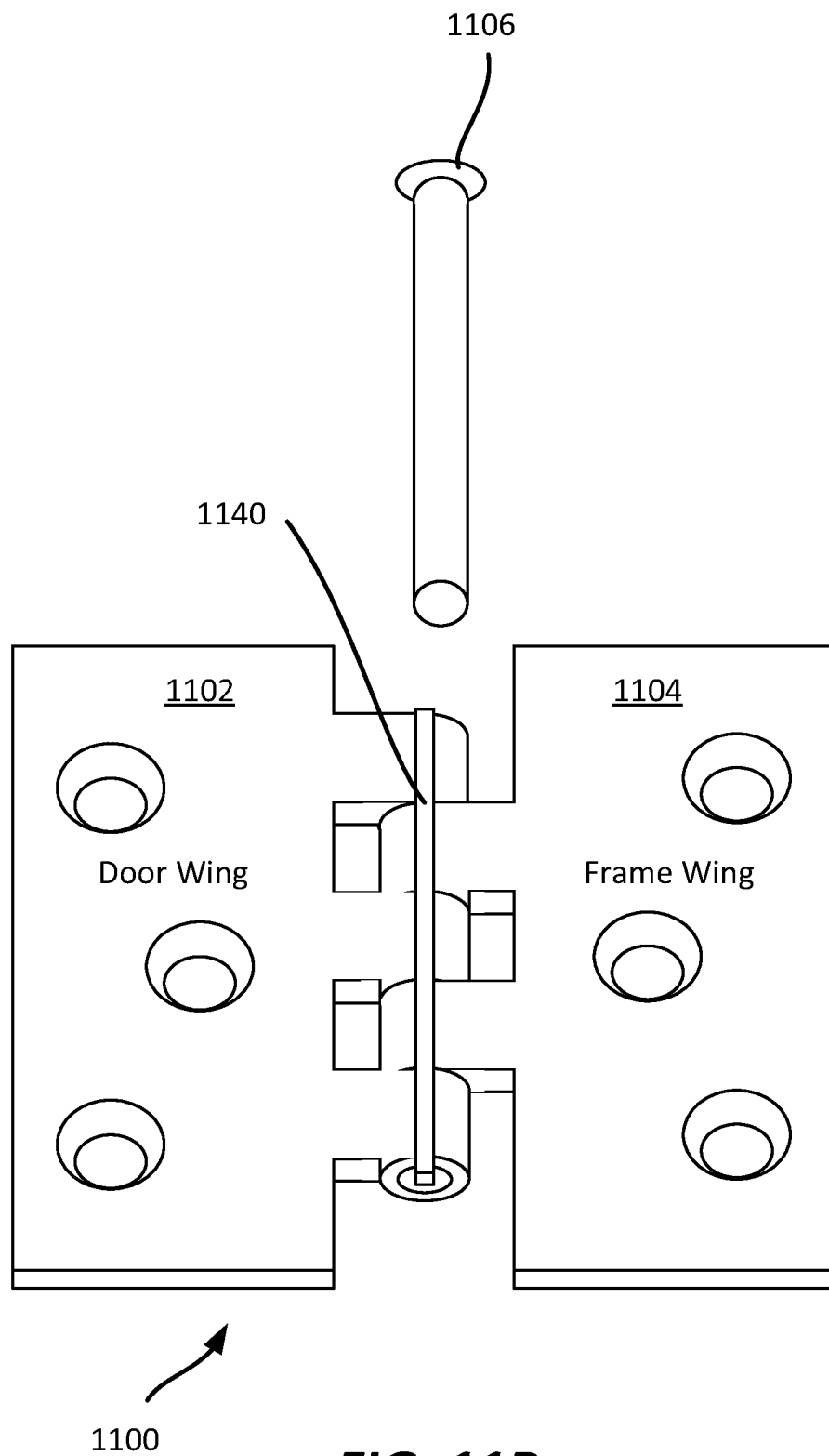


FIG. 11B

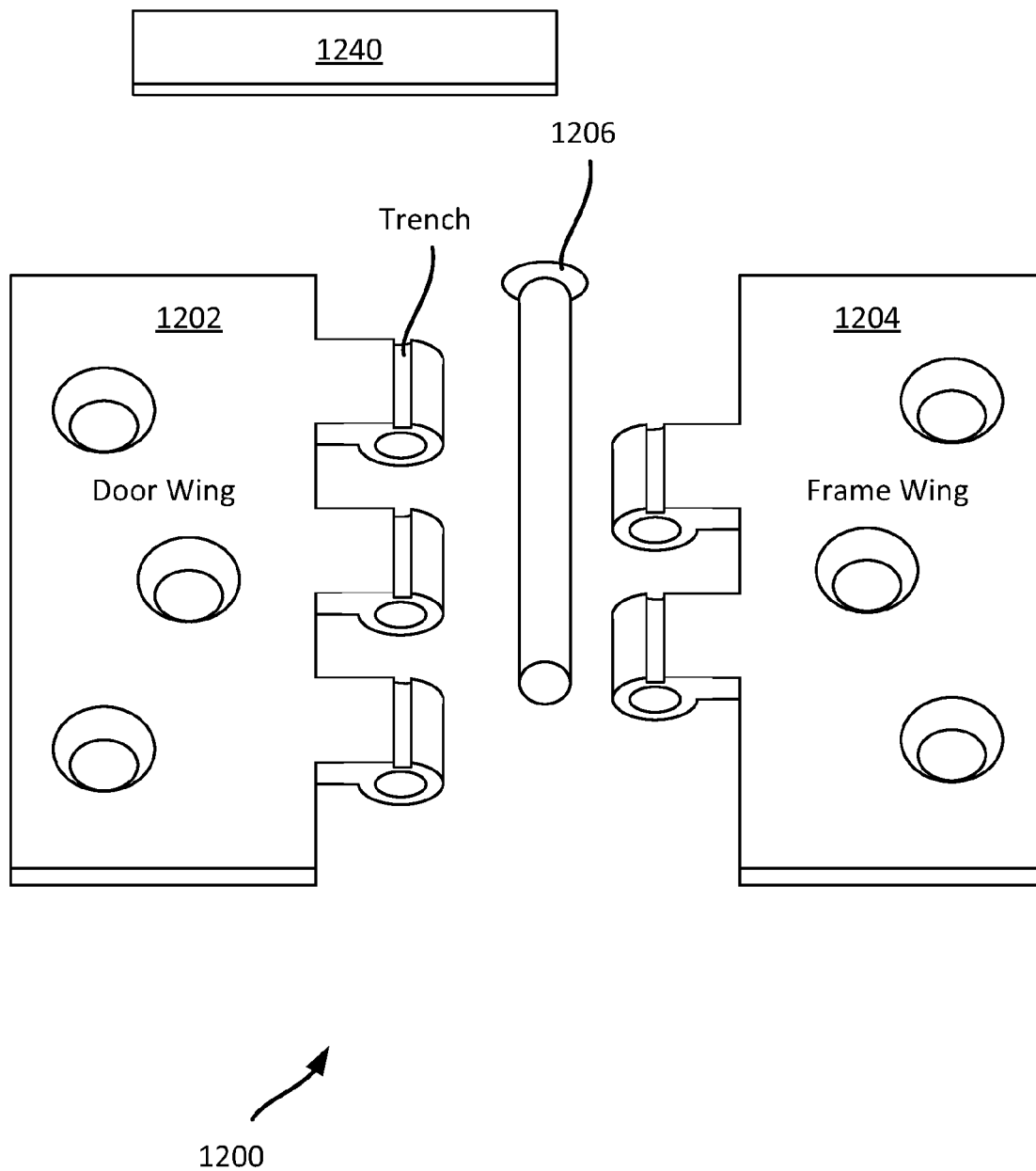


FIG. 12A

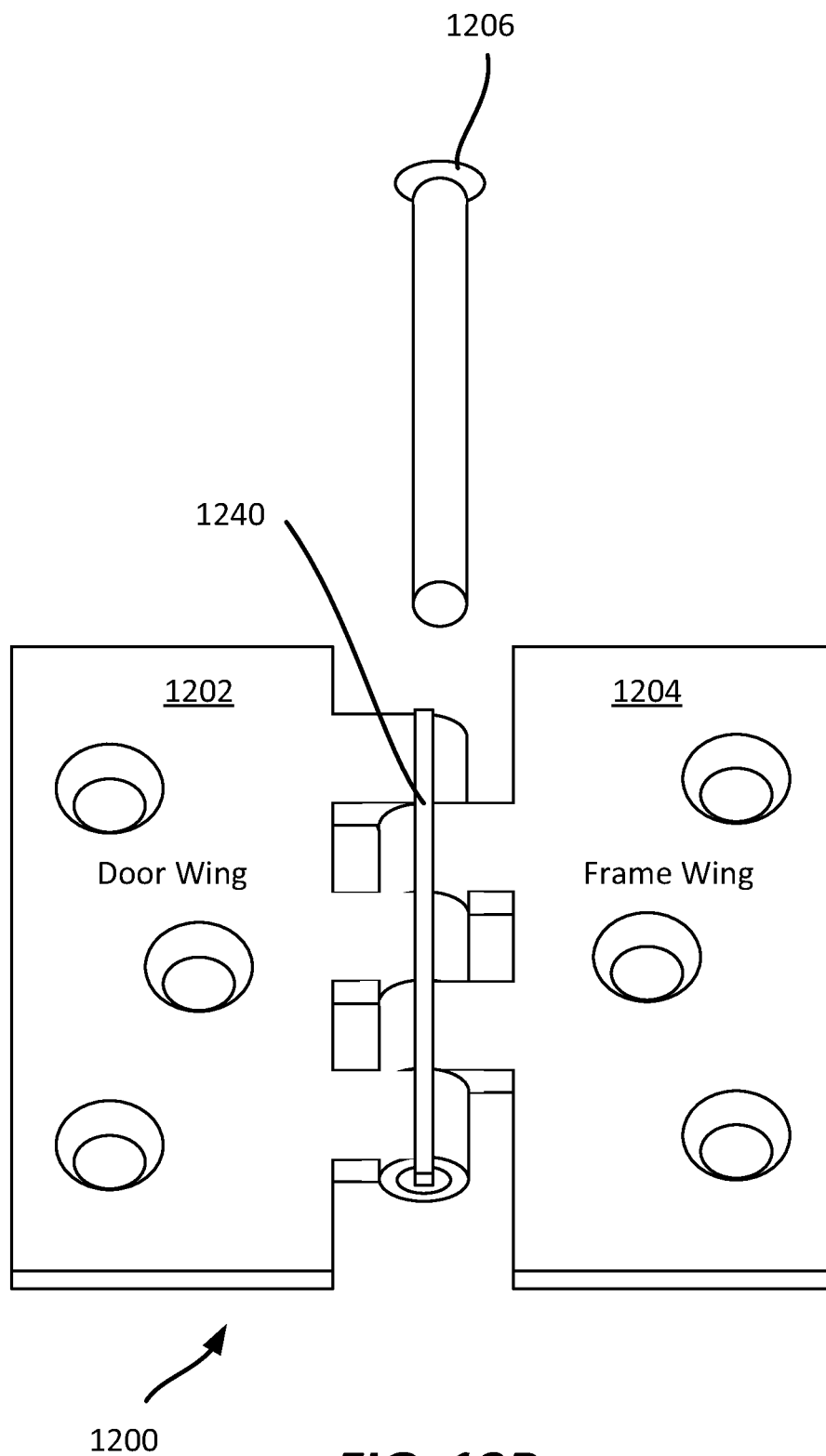


FIG. 12B

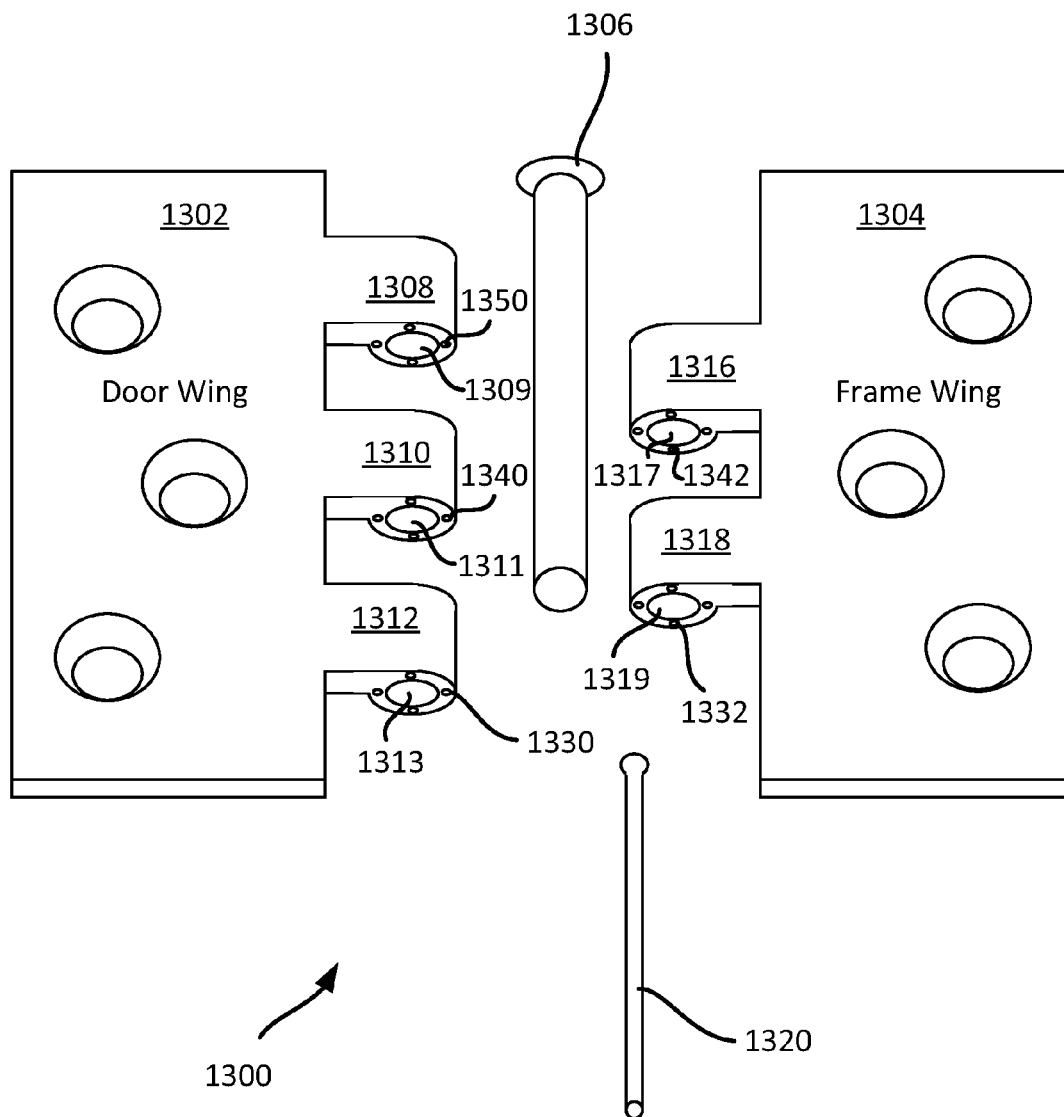


FIG. 13

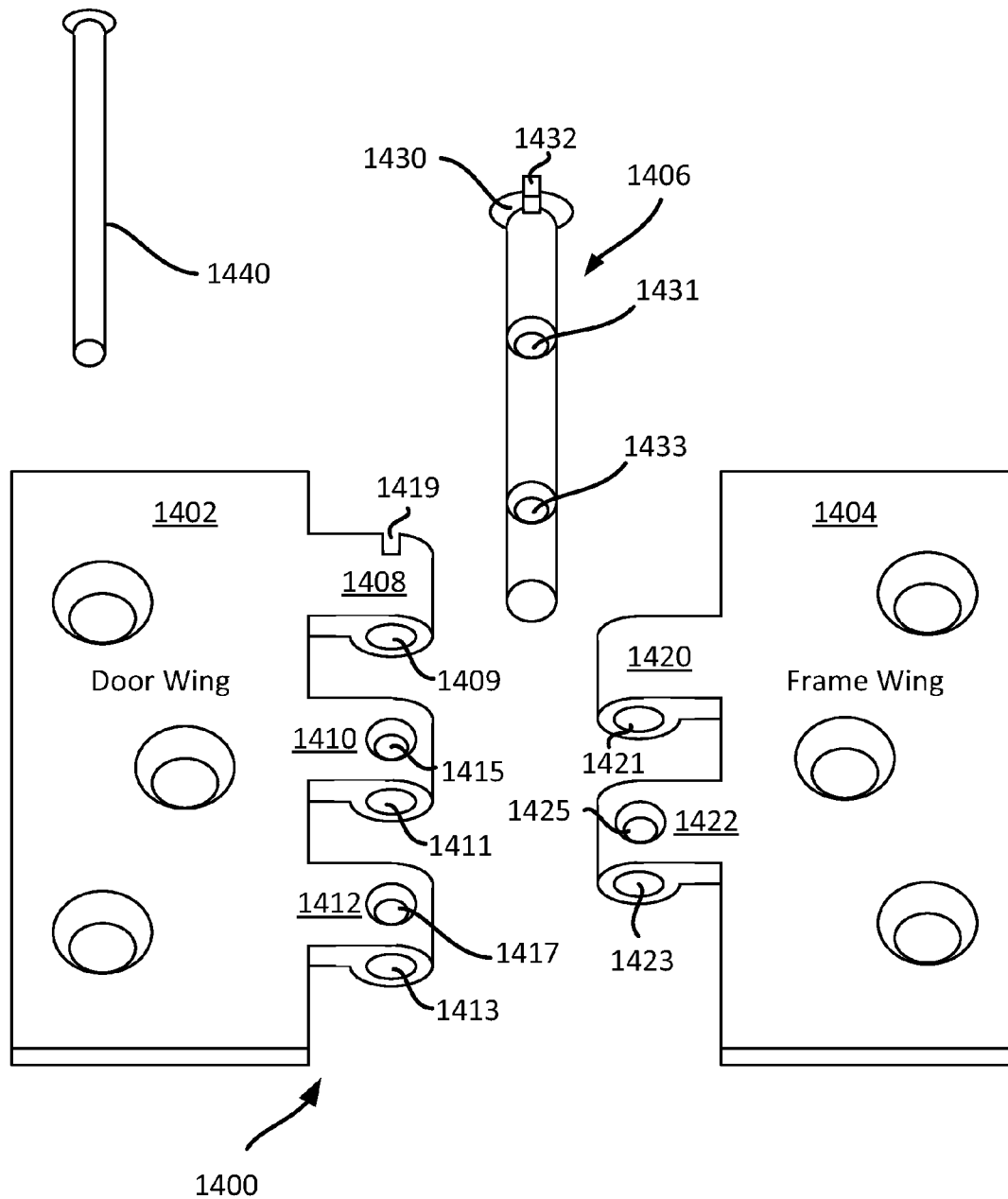


FIG. 14

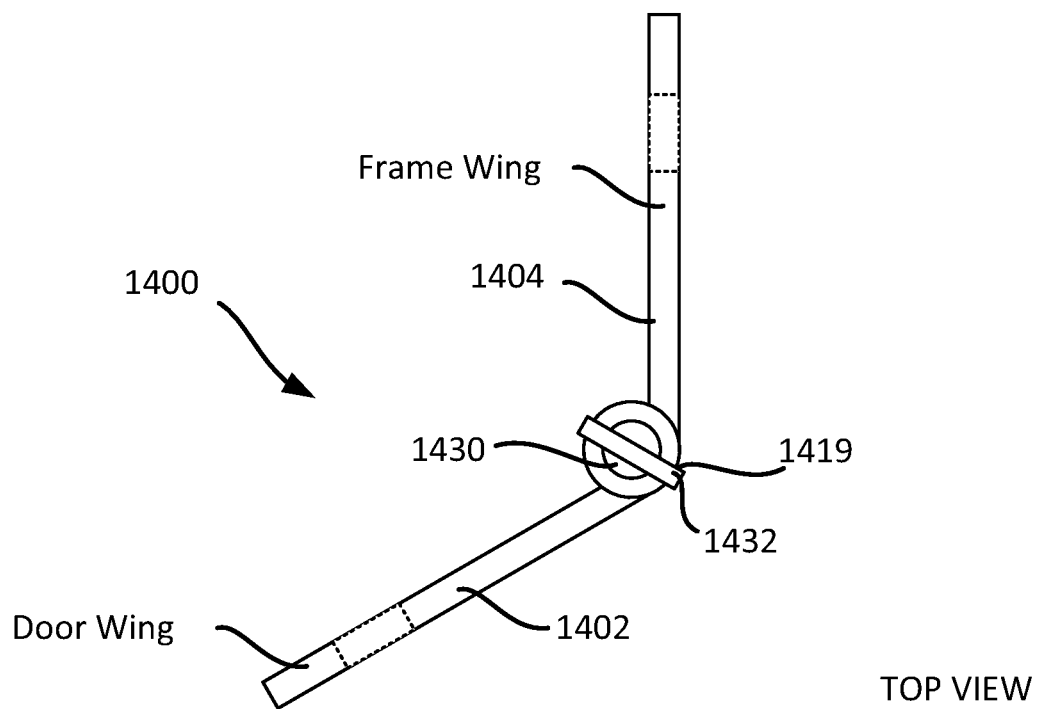


FIG. 15

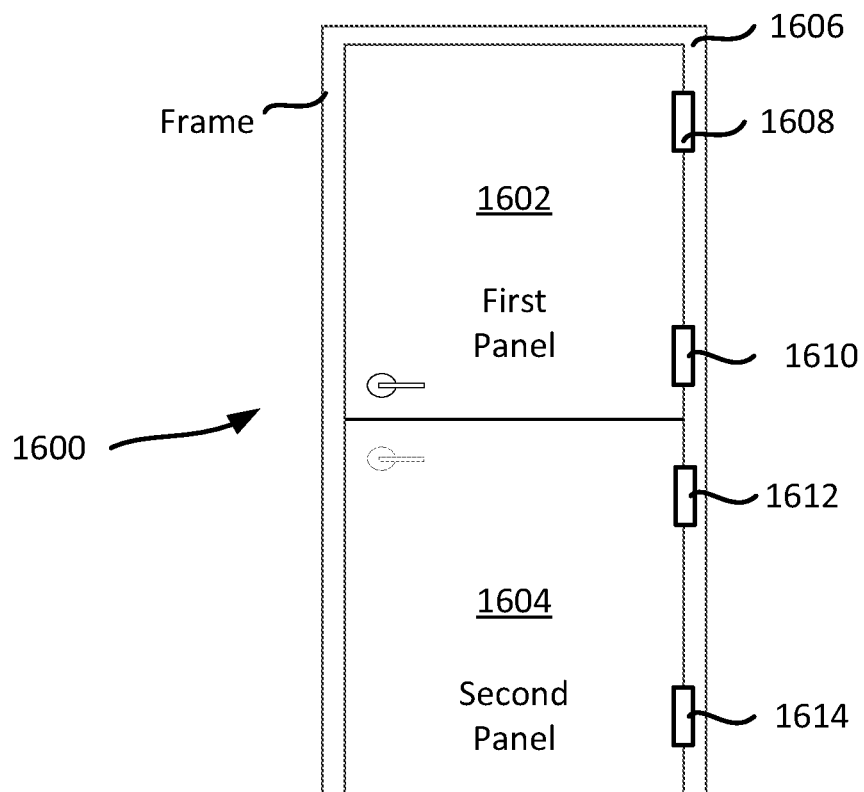


FIG. 16

1

MODIFIED DOOR HINGE COMPRISING LOCKING MECHANISM

The present application claims priority to U.S. Provisional Application No. 61/820,062, entitled "Modified Door Hinge Locking Mechanism", filed May 6, 2013, which is hereby expressly incorporated by reference herein.

BACKGROUND

1. Field of Invention

At least one feature pertains to a modified door hinge with locking mechanism.

2. Background of Invention

A door is an entryway into a room. A door can pivot about a frame through one or more hinges, which allows the door to be opened and closed. FIG. 1 illustrates an example of a door. Specifically, FIG. 1 illustrates a door **100** that is coupled to a frame **108** through several hinges (e.g., first hinge **102**, second hinge **104**, and third hinge **106**). As mentioned above, these hinges **102-106** allow the door **100** to pivot and thereby allow the door **100** to open and close. As shown in FIG. 1, the hinge **102** includes several components, including a first set of knuckles **110**, a second set of knuckles **112** and a pin **114**.

FIG. 2 illustrates a more detailed example of a conventional hinge used to couple a door to a frame (e.g., wall). As shown in FIG. 2, the hinge **200** includes a first wing **202**, a second wing **204** and a pin **206**. The first wing **202** includes several knuckles that have holes in them. The second wing **204** also includes several knuckles that have holes in them as well. The first wing **202** is a door wing that is coupled to the door. The second wing **204** is a frame wing that is coupled to the frame. The first wing **202** and the second wing **204** may be coupled together through the pin **206**. When the first wing **202** and the second wing **204** are coupled together, the pin **206** traverses through the holes in the knuckles of the first and second wings **202-204**.

The door can be locked into a closed position through the use of locks/bolts that are located at near the handle of the door. In some instances, it may be desirable to leave the door ajar and/or slightly open. For example, it may be desirable to leave a door slightly open so that a pet (e.g., dog) can go in and out of a room, while preventing another pet (e.g., another larger dog) from entering the room. Typically, to secure/lock the door in a slightly ajar position and/or open position (e.g., slightly ajar from the closed position), an object is typically placed at the base of the door. For example, a wedge may be positioned at the base of the door to lock the door in an ajar/open position. However, the use of a wedge is often unreliable as it can be easily moved/removed. In addition, a wedge is aesthetically unpleasant.

As such there is a need for a locking mechanism that allows a user to secure/lock a door in an open/ajar position. Ideally, such a locking mechanism allows for variable/multiple locking positions.

SUMMARY

Various features, apparatus and methods described herein provide a modified door hinge with a locking mechanism.

A first example provides a hinge that includes a first wing, a second wing, a coupling pin, and a locking pin. The first wing includes a first knuckle and a second knuckle. The first knuckle includes a first hole. The second knuckle includes a second hole and a first locking hole. The second wing includes a third knuckle and a fourth knuckle. The third knuckle includes a third hole. The fourth knuckle includes a

2

fourth hole. The coupling pin is configured to couple the first wing to the second wing through the first, second, third and fourth knuckles. The locking pin is configured to limit the hinge in a particular position when the locking pin is inserted into the first locking hole of the second knuckle.

According to an aspect, the locking pin is configured to lock the hinge in a particular position when the locking pin is inserted into the locking hole of the second knuckle.

According to an aspect, the first wing is a door wing and the second wing is a frame wing.

According to an aspect, the coupling pin includes at least one locking hole.

According to an aspect, the first wing further includes a fifth knuckle, the fifth knuckle comprising a fifth hole, wherein the fourth knuckle comprises a second locking hole. In some implementations, the locking pin includes a first protrusion and a second protrusion, the first protrusion is configured to be inserted in the first locking hole, the second protrusion configured to be inserted in the second locking hole.

A second example provides a hinge that includes a first wing, a second wing, a coupling pin, and a locking slab. The first wing includes a first knuckle and a second knuckle. The first knuckle includes a first hole and a first slot. The second knuckle includes a second hole. The second wing includes a third knuckle and a fourth knuckle. The third knuckle includes a third hole. The fourth knuckle includes a fourth hole. The coupling pin is configured to couple the first wing to the second wing through the first, second, third and fourth knuckles. The locking slab is configured to limit the hinge in a particular position when the locking slab is inserted into the first slot of the first knuckle.

According to an aspect, the locking slab is configured to lock the hinge in a particular position when the locking slab is inserted into the first slot of the first knuckle.

According to an aspect, the first wing is a door wing and the second wing is a frame wing.

According to an aspect, the second knuckle comprises a second slot, the third knuckle comprising a third slot. In some implementations, the locking slab is configured to lock the hinge in a particular position when the locking slab is inserted into the first slot, the second slot and the third slot.

According to an aspect, the coupling pin includes a pin slot, the locking slab being configured to limit the hinge in a particular position when the locking slab is inserted into the first slot of the first knuckle and the pin slot of the coupling pin.

According to an aspect, the coupling pin includes at least one locking hole.

DRAWINGS

Various features, nature and advantages may become apparent from the detailed description set forth below when taken in conjunction with the drawings in which like reference characters identify correspondingly throughout.

FIG. 1 illustrates a conventional door hinge on a door.

FIG. 2 illustrates another conventional door hinge.

FIG. 3 illustrates an example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door.

FIG. 4 illustrates an example of another hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door.

FIG. 5 illustrates another example of another hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door.

3

FIG. 6 illustrates examples of pins that may be used with the hinge/hinge assembly.

FIG. 7A illustrates a conceptual example of how a hinge/hinge assembly with a mechanism for locking, securing, and/or limiting the movement, position of a door operates.

FIG. 7B illustrates another conceptual example of how a hinge/hinge assembly with a mechanism for locking, securing, and/or limiting the movement, position of a door operates.

FIG. 8A illustrates an example of how open a door can be without a locking pin.

FIG. 8B illustrates an example of how a locking pin can limit, secure, and/or lock a door into a particular position.

FIG. 9 illustrates another example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door.

FIG. 10 illustrates another example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door.

FIG. 11 illustrates an example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door.

FIG. 12A illustrates an example of hinge/hinge assembly that includes various trenches/slots that traverse along the length of the knuckles.

FIG. 12B illustrates an example of hinge/hinge assembly that includes various trenches/slots that traverse along the length of the knuckles.

FIG. 13 illustrates another example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door.

FIG. 14 illustrates another example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door.

FIG. 15 illustrates a plan view of a hinge/hinge assembly.

FIG. 16 illustrates an example of a door that one or more of the hinge/hinge assembly.

DETAILED DESCRIPTION

The following detailed description is of the best currently contemplated modes of carrying out the invention. The description is not to be taken in a limiting sense, but is made merely for the purpose of illustrating the general principles of the invention.

Overview

Some implementations provide a hinge that includes a first wing, a second wing, a coupling pin, and a locking pin. The first wing includes a first knuckle and a second knuckle. The first knuckle includes a first hole. The second knuckle includes a second hole and a first locking hole. The second wing includes a third knuckle and a fourth knuckle. The third knuckle includes a third hole. The fourth knuckle includes a fourth hole. The coupling pin is configured to couple the first wing to the second wing through the first, second, third and fourth knuckles. The locking pin is configured to limit the hinge in a particular position when the locking pin is inserted into the first locking hole of the second knuckle. In some implementations, the locking pin is configured to lock the hinge in a particular position when the locking pin is inserted into the locking hole of the second knuckle.

Exemplary Modified Hinges

FIG. 3 illustrates an example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door in some implementations. As shown in

4

FIG. 3, the hinge/hinge assembly 300 includes a first wing 302, a second wing 304, and a pin 306.

In some implementations, the first wing 302 is a door wing that is coupled to a door. The first wing 302 is coupled to a first knuckle 308, a second knuckle 310, and a third knuckle 312. The first knuckle 308 includes a first hole 309 that traverses through a first direction (e.g., along the longitudinal direction) in the first knuckle 308. The second knuckle 310 includes a second hole 311 that traverses through the first direction (e.g., along the longitudinal direction) in the second knuckle 310. The third knuckle 312 includes a third hole 313 that traverses through the first direction (e.g., along the longitudinal direction) in the third knuckle 312. The third knuckle 312 also includes another third hole 315 that traverses through a second direction (e.g., along lateral direction) in the third knuckle 312. The second direction is different than the first direction.

In some implementations, the second wing 304 is a frame wing that is coupled to a frame. The second wing 304 is coupled to a fourth knuckle 316 and a fifth knuckle 318. The fourth knuckle 316 includes a fourth hole 317 that traverses through a first direction (e.g., along the longitudinal direction) in the fourth knuckle 316. The fifth knuckle 318 includes a fifth hole 319 that traverses through the first direction (e.g., along the longitudinal direction) in the fifth knuckle 318.

In some implementations, the pin 306 is a coupling pin that couples the first wing 302 with the second wing 304. Specifically, the pin 306 couples the first and second wings 302-304 by traversing through the holes 309, 317, 311 and 319 in some implementations. However, in some implementations, the pin 306 may traverse more or less holes. In some implementations, the pin 306 may include one or more holes (not shown). Examples of holes in a pin will be further described below.

To lock, secure, and/or limit the range of how much a door can be opened, a second pin 320 may be used. Specifically, in some implementations, the second pin 320 (which may be part of the hinge/hinge assembly 300), is inserted in the hole 315 to limit the range of how much a door can be opened. When the second pin 320 is inserted in the hole 315, the second pin 320 may prevent the door from fully opening (e.g., 90 degree open), since the second pin 320 may hit a frame/wall as the door is opened and the second pin 320 pivots towards the frame/wall. In some implementations, the length of the second pin 320 and/or the angle at which the pin 320 (e.g., angle of the hole 315 in the third knuckle 312) is inserted will determine how much a door can be opened. Thus, different implementations may have a hole (e.g., hole 315) in different positions/angles in a knuckle. Moreover, different knuckles may have different number of holes (e.g., more than one hole). In addition, the hole in which the pin is inserted may be located on a different wing.

FIG. 4 illustrates an example of another hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door in some implementations. As shown in FIG. 4, the hinge/hinge assembly 400 includes a first wing 402, a second wing 404, a first pin 406, and a second pin 420.

The first wing 402 is a door wing that is coupled to a door. In some implementations, the second wing 404 is a frame wing that is coupled to a frame. The second wing 404 is coupled to a first knuckle 408, a second knuckle 410, and a third knuckle 412. The first knuckle 408 includes a first hole 409 that traverses through a first direction (e.g., along the longitudinal direction) in the first knuckle 408. The second knuckle 410 includes a second hole 411 that traverses through the first direction (e.g., along the longitudinal direction) in the second knuckle 410. The third knuckle 412 includes a third hole 413 that traverses through the first direction (e.g., along

5

the longitudinal direction) in the third knuckle **412**. The third knuckle **412** also includes another third hole **415** that traverses through a second direction (e.g., along lateral direction) in the third knuckle **412**. The second direction is different than the first direction.

To lock, secure, and/or limit the range of how much a door can be opened, the second pin **420** may be used. Specifically, in some implementations, the second pin **420** is inserted in the hole **415** to limit the range of how much a door can be opened. As can be seen in FIG. 4, the location/angle of the hole **415** is different than the location of the hole **315** in FIG. 3. In some implementations, the pin **406** may include one or more holes (not shown). Examples of holes in a pin will be further described below.

In some implementations, a hinge assembly may include additional knuckles and holes. FIG. 5 illustrates such an example of a hinge/hinge assembly. As shown in FIG. 5, the hinge/hinge assembly **500** includes a first wing **502**, a second wing **504**, and a pin **506**.

In some implementations, the first wing **502** is a door wing that is coupled to a door. The first wing **502** is coupled to a first knuckle **508**, a second knuckle **510**, a third knuckle **512** and a fourth knuckle **514**. The first knuckle **508** includes a first hole **509** that traverses through a first direction (e.g., along the longitudinal direction) in the first knuckle **508**. The second knuckle **510** includes a second hole **511** that traverses through the first direction (e.g., along the longitudinal direction) in the second knuckle **510**. The third knuckle **512** includes a third hole **513** that traverses through the first direction (e.g., along the longitudinal direction) in the third knuckle **512**. The third knuckle **512** also includes another third hole **517** that traverses through a second direction (e.g., along lateral direction) in the third knuckle **512**. The second direction is different than the first direction. The fourth knuckle **514** includes a fourth hole **515** that traverses through the first direction (e.g., along the longitudinal direction) in the fourth knuckle **514**. The fourth knuckle **514** also includes another fourth hole **519** that traverses through the second direction (e.g., along lateral direction) in the fourth knuckle **514**.

In some implementations, the second wing **504** is a frame wing that is coupled to a frame. The second wing **504** is coupled to a fifth knuckle **520**, a sixth knuckle **522**, and a seventh knuckle **524**. The fifth knuckle **520** includes a fifth hole **521** that traverses through the first direction (e.g., along the longitudinal direction) in the fifth knuckle **520**. The sixth knuckle **522** includes a sixth hole **523** that traverses through the first direction (e.g., along the longitudinal direction) in the sixth knuckle **522**. The seventh knuckle **524** includes a seventh hole **525** that traverses through the first direction (e.g., along the longitudinal direction) in the seventh knuckle **524**. The seventh knuckle **524** also includes another seventh hole **527** that traverses through the second direction (e.g., along lateral direction) in the seventh knuckle **524**.

FIG. 5 also illustrates several pins **530-534**. One or more of the pins **530-534** may be inserted in holes **517**, **519**, and/or **527** of FIG. 5 to lock, secure, and/or limit the range of how much a door can be opened. The pins **530-534** may be referred as locking pins in some implementations. In some implementations, different sets of pins may be used. FIG. 6 illustrates examples of other pins that may be used with the hinge/hinge assembly described in the disclosure. Specifically, FIG. 6 illustrates a first pin **600** and a second pin **610**. The first and second pins **600** and **610** may be referred as locking pins in some implementations. The first pin **600** includes a first protrusion **602** and a second protrusion **604**, which are coupled together through a connecting member **606**. In some implementations, the first protrusion **602**, the connecting member

6

606 and the second protrusion **604** are one single piece. In some implementations, the first protrusion **602** and the second protrusion **604** may be inserted in one of the holes described in FIG. 5. For example, the first protrusion **602** and the second protrusion **604** of the pin **600** may be inserted in holes **517**, **519** and/or **527** of FIG. 5.

The second pin **610** includes a first protrusion **602**, a second protrusion **614** and a third protrusion **618**, which are coupled together through a first connecting member **616** and a second connecting member **620**. In some implementations, the first protrusion **612**, the first connecting member **616**, the second protrusion **614**, the second connecting member **620**, and the third protrusion **618** are one single piece. In some implementations, the first protrusion **612**, the second protrusion **614**, and the third protrusion **618** may be inserted in one of the holes described in FIG. 5. For example, the first protrusion **612**, the second protrusion **614**, and the third protrusion **618** of the pin **610** may be inserted in holes **517**, **519** and/or **527** of FIG. 5. Different implementations may have different sizes and shapes. For example, one or more of the locking pins may be straight, curved, and/or non-linear.

Having described various examples of hinges/hinge assemblies, a conceptual example of a hinge/hinge assembly under operating condition will now be described.

FIG. 7A illustrates a conceptual example of how a hinge/hinge assembly with a mechanism for locking, securing, and/or limiting the movement, position of a door operates. Specifically, FIG. 7A illustrates a plan view (e.g., top view) of a hinge **700** that includes a first wing **702**, a second wing **704**, a first pin **706**, and a second pin **708**. The hinge **700** also includes several knuckles (which are not visible). The hinge **700** may be any of the hinges (e.g., hinges **300**, **400**, **500**, **600**) described in the present disclosure. The first wing **702** may be a door wing that is coupled to a door. The second wing **704** may be a frame wing that is coupled to a frame. As shown in FIG. 7A, the first pin **706** traverses through a first set of holes in knuckles (not visible), which allow the first wing **702** to be coupled to the second wing **704**. FIG. 7A also illustrates the second pin **708**, which may be a locking pin, traversing through holes in knuckles (not visible). The second pin **708** may be any of the pins (e.g., locking pins) described in the present disclosure (e.g., pins **420**, **600**, **610**). As shown in FIG. 7A, when the second pin **708** is inserted in one or more holes in the hinge/hinge assembly (e.g., knuckles), the second pin **708** provides a mechanism for locking/securing the door in a particular position and/or provides a limited range to open the door.

FIG. 7B illustrates a conceptual example of how a hinge/hinge assembly with a mechanism for locking, securing, and/or limiting the movement, position of a door operates. Specifically, FIG. 7B illustrates a plan view (e.g., top view) of a hinge **710** that includes a first wing **712**, a second wing **714**, a first pin **716**, and a second pin **718**. The hinge **710** also includes several knuckles (which are not visible). The hinge **710** may be any of the hinges (e.g., hinges **300**, **400**, **500**, **600**) described in the present disclosure. The first wing **712** may be a door wing that is coupled to a door. The second wing **714** may be a frame wing that is coupled to a frame. As shown in FIG. 7B, the first pin **716** traverses through a first set of holes in knuckles (not visible), which allow the first wing **712** to be coupled to the second wing **714**. FIG. 7B also illustrates the second pin **718**, which may be a locking pin, traversing through holes in knuckles (not visible) and a hole in the first pin **716**. The second pin **718** may be any of the pins (e.g., locking pins) described in the present disclosure (e.g., pins **420**, **600**, **610**). As shown in FIG. 7B, when the second pin **718** is inserted in one or more holes in the hinge/hinge assembly

bly (e.g., knuckles), the second pin **718** provides a mechanism for locking/securing the door in a particular position and/or provides a limited range to open the door.

FIG. **8A** illustrates an example of how open a door can be without a locking pin. As shown in FIG. **8A**, the range of motion of the door is very wide. In contrast, FIG. **8B** illustrates an example of how a locking pin can limit, secure, and/or lock a door into a particular position (e.g., slightly ajar, slightly open).

FIG. **9** illustrates another example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door in some implementations. As shown in FIG. **9**, the hinge/hinge assembly **900** includes a first wing **902**, a second wing **904**, a pin **906**, and a slab **920**.

In some implementations, the first wing **902** is a door wing that is coupled to a door. In some implementations, the second wing **904** is a frame wing that is coupled to a frame. The second wing **904** is coupled to a first knuckle **908**, a second knuckle **910**, and a third knuckle **912**. The first knuckle **908** includes a first hole **909** that traverses through a first direction (e.g., along the longitudinal direction) in the first knuckle **908**. The first knuckle **908** includes a trench **915** on the top portion of the first knuckle **908**. The second knuckle **910** includes a second hole **911** that traverses through the first direction (e.g., along the longitudinal direction) in the second knuckle **910**. The third knuckle **912** includes a third hole **913** that traverses through the first direction (e.g., along the longitudinal direction) in the third knuckle **912**.

In some implementations, the pin **906** is a coupling pin that couples the first wing **902** with the second wing **904**. The top portion of the **906** includes a trench **907**.

To lock, secure, and/or limit the range of how much a door can be opened, slab **920** may be used. Specifically, in some implementations, the slab **920** (which may be part of the hinge/hinge assembly **900**), is aligned with the trench **915** and the trench **907**. When the slab **920** is inserted in the trenches **907** and **915**, the slab **920** may prevent the door from fully opening (e.g., 90 degree open), since the slab **920** may hit a frame/wall as the door is opened and the slab **920** pivots towards the frame/wall. In some implementations, the length of the slab **920** and/or the angle at which the slab **920** (e.g., angles of the trenches **907** and **915**) is coupled to the hinge **900** will determine how much a door can be opened.

FIG. **10** illustrates another example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door in some implementations. As shown in FIG. **10**, the hinge/hinge assembly **1000** includes a first wing **1002**, a second wing **1004**, a pin **1006**, and a slab **1020**.

In some implementations, the first wing **1002** is a door wing that is coupled to a door. In some implementations, the second wing **1004** is a frame wing that is coupled to a frame. The second wing **1004** is coupled to a first knuckle **1008**, a second knuckle **1010**, and a third knuckle **1012**. The first knuckle **1008** includes a first hole **1009** that traverses through a first direction (e.g., along the longitudinal direction) in the first knuckle **1008**. The first knuckle **908** also includes a first cavity **1019** that traverses through the first direction. The second knuckle **1010** includes a second hole **1011** that traverses through the first direction (e.g., along the longitudinal direction) in the second knuckle **1010**. The second knuckle **1008** also includes a second cavity **1021** that traverses through the first direction. The third knuckle **1012** includes a third hole **1013** that traverses through the first direction (e.g., along the longitudinal direction) in the third knuckle **1012**. The third knuckle **1012** also includes a third cavity **1023** that traverses through the first direction.

The first wing **1002** is coupled to a fourth knuckle **1030** and a fifth knuckle **1032**. The fourth knuckle **1030** includes a fourth hole **1031** that traverses through a first direction (e.g., along the longitudinal direction) in the fourth knuckle **1030**. The fourth knuckle **1030** also includes a fourth cavity **1035** that traverses through the first direction. The fifth knuckle **1032** includes a fifth hole **1033** that traverses through the first direction (e.g., along the longitudinal direction) in the fifth knuckle **1032**. The fifth knuckle **1032** also includes a fifth cavity **1037** that traverses through the first direction.

In some implementations, the pin **1006** is a coupling pin that couples the first wing **1002** with the second wing **1004**.

To lock, secure, and/or limit the range of how much a door can be opened, slab **1040** may be used. Specifically, in some implementations, the slab **1040** (which may be part of the hinge/hinge assembly **1000**), is aligned with one or more cavities (e.g., cavities **1019**, **1021**, **1023**, **1035**, **1037**). In some implementations, when the slab **1040** is inserted in one or more of the cavities, the slab **1040** may lock the door to a particular position. In some implementations, when the slab **1040** is inserted in one or more of the cavities, the slab **1040** may prevent the door from fully opening (e.g., 90 degree open), since the slab **1040** may hit a frame/wall as the door is opened and the slab **1040** pivots towards the frame/wall. The slab **1040** may be a magnetic slab. Different slabs may have different shapes.

Different implementations may have different positions for the cavities. FIG. **11A** illustrates an example of a hinge/hinge assembly that includes cavities in different positions. In some implementations, the hinge/hinge assembly **1100** of FIG. **11A** operates in a similar manner as the hinge/hinge assembly **1000** of FIG. **10**. FIG. **11B** illustrates the slab **1140** coupled to one or more of the cavities in the knuckles of the wings (e.g., wings **1102-1104**). The slab **1140** may be a magnetic slab. Different slabs may have different shapes.

Although FIGS. **10** and **11A-11B** illustrate cavities that traverse along the length (e.g., longitudinal) of the knuckles and/or hinge assembly, in some implementations, the cavities can be replaced with trenches/slots that traverse along the length (e.g., longitudinal) of the knuckles and/or hinge assembly. One advantage of using trenches/slots is that each knuckle can have multiple trenches that traverse along the length (e.g., longitudinal) of the knuckles, which would allow the hinge assembly to be locked in multiple, various positions.

FIGS. **12A-12B** illustrate an example of hinge/hinge assembly that includes various trenches/slots that traverse along the length of the knuckles. FIG. **12B** illustrates the slab **1240** coupled to one or more of the trenches in the knuckles of the wings (e.g., wings **1202-1204**). The slab **1240** may be a magnetic slab. Although the knuckle is shown with one trench/slot, in some implementations, one or more of the knuckles may have more than one trench/slot. Different implementations may have different positions, locations, and/or angles for the trench/slot in the knuckles.

FIG. **13** illustrates another example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door in some implementations. As shown in FIG. **13**, the hinge/hinge assembly **1300** includes a first wing **1302**, a second wing **1304**, a first pin **1306**, and a second pin **1308**.

In some implementations, the first wing **1302** is a door wing that is coupled to a door. The first wing **1302** is coupled to a first knuckle **1308**, a second knuckle **1310**, and a third knuckle **1312**. The first knuckle **1308** includes a first hole **1309** that traverses through a first direction (e.g., along the longitudinal direction) in the first knuckle **1308**. The second

knuckle **1310** includes a second hole **1311** that traverses through the first direction (e.g., along the longitudinal direction) in the second knuckle **1310**. The third knuckle **1312** includes a third hole **1313** that traverses through the first direction (e.g., along the longitudinal direction) in the third knuckle **1312**. As shown in FIG. 13, each of the first, second and third knuckles **1308**, **1310** and **1312** includes several holes (e.g., hole **1330**, **1340**, **1350**) that traverse along the first direction (e.g., length) of the knuckles.

In some implementations, the second wing **1304** is a frame wing that is coupled to a frame. The second wing **1304** is coupled to a fourth knuckle **1316** and a fifth knuckle **1318**. The fourth knuckle **1316** includes a fourth hole **1317** that traverses through a first direction (e.g., along the longitudinal direction) in the fourth knuckle **1316**. The fifth knuckle **1318** includes a fifth hole **1319** that traverses through the first direction (e.g., along the longitudinal direction) in the fifth knuckle **1318**. As further shown in FIG. 13, each of the fourth and fifth knuckles **1316** and **1318** include several locking holes (e.g., hole **1332**, **1342**) that traverse along the first direction (e.g., length) of the knuckles.

In some implementations, the pin **1306** is a coupling pin that couples the first wing **1302** with the second wing **1304**. Specifically, the pin **1306** couples the first and second wings **1302-304** by traversing through the holes **1308**, **1316**, **1310** and **1318** in some implementations. However, in some implementations, the pin **1306** may traverse more or less holes. In some implementations, the pin **1306** may include one or more holes (not shown). Examples of holes in a pin will be further described below.

To lock, secure, and/or limit the range of how much a door can be opened, a second pin **1320** may be used. Specifically, in some implementations, the second pin **1320** (which may be part of the hinge/hinge assembly **1300**), is inserted in the holes (e.g., holes **1330**, **1332**, **1340**, **1342**, **1350**) to limit the range of how much a door can be opened. In some implementations, when the second pin **1320** is inserted in one or more of the holes (e.g., holes **1330-1332**, **1340-1342**, **1350**), the second pin **1320** (e.g., locking pin) may lock the door to a particular position. In some implementations, inserting the second pin **1320** in different holes will lock the door in different positions.

As previously described, in the some implementations, the coupling pin may have one or more holes. FIG. 14 illustrates yet another example of a modified hinge/hinge assembly that includes a mechanism for limiting the range/movement of a door in some implementations. As shown in FIG. 14, the hinge/hinge assembly **1400** includes a first wing **1402**, a second wing **1404**, a first pin **1406**, and a second pin **1440**.

In some implementations, the first wing **1402** is a door wing that is coupled to a door. The first wing **1402** is coupled to a first knuckle **1408**, a second knuckle **1410**, and a third knuckle **1412**. The first knuckle **1408** includes a first hole **1409** that traverses through a first direction (e.g., along the longitudinal direction) in the first knuckle **1408**. The first knuckle **1408** also includes a trench **1419** on the top portion of the first knuckle **1408**. The second knuckle **1410** includes a second hole **1411** that traverses through the first direction (e.g., along the longitudinal direction) in the second knuckle **1410**. The second knuckle **1410** also includes another second hole **1415** that traverse through a second direction (e.g., along lateral direction) in the second knuckle **1410**. The third knuckle **1412** includes a third hole **1413** that traverses through the first direction (e.g., along the longitudinal direction) in the third knuckle **1412**. The third knuckle **1412** also includes another third hole **1417** that traverses through the

second direction (e.g., along lateral direction) in the third knuckle **1412**. The second direction is different than the first direction.

In some implementations, the second wing **1404** is a frame wing that is coupled to a frame. The second wing **1404** is coupled to a fourth knuckle **1420** and a fifth knuckle **1422**. The fourth knuckle **1420** includes a fourth hole **1421** that traverses through a first direction (e.g., along the longitudinal direction) in the fourth knuckle **1420**. The fifth knuckle **1422** includes a fifth hole **1423** that traverses through the first direction (e.g., along the longitudinal direction) in the fifth knuckle **1422**. The fifth knuckle **1422** also includes another fifth hole **1425** that traverses through a second direction (e.g., along lateral direction) in the third knuckle **1422**.

In some implementations, the pin **1406** is a coupling pin that couples the first wing **1402** with the second wing **1404**. Specifically, the pin **1406** couples the first and second wings **1402-1404** by traversing through the holes **1409**, **1420**, **1411** and **1421** in some implementations. However, in some implementations, the pin **1406** may traverse more or less holes. As further shown in FIG. 14, the pin **1406** includes a first hole **1431** and a second hole **1433**. Different implementations may have different number of holes. In addition, the position, location and/or angle of the holes may be different with different implementations.

To lock, secure, and/or limit the range of how much a door can be opened, a second pin **1440** may be used. Specifically, in some implementations, the second pin **1440** (which may be part of the hinge/hinge assembly **1400**), is inserted in one or more of the locking holes (e.g., holes **1431**, **1433**, **1415**, **1413**, **1422**) to limit the range of how much a door can be opened. In some implementations, when the second pin **1440** is inserted in one or more of the locking holes (e.g., holes **1431**, **1433**, **1415**, **1413**, **1422**), the second pin **1440** (e.g., locking pin) may lock the door to a particular position. In some implementations, inserting the second pin **1440** in different holes will lock the door in different positions.

FIG. 14 also includes a cap **1430** that is coupled to the pin **1406**. The cap **1430** includes a protrusion **1432** that may be coupled to a trench/slot (not visible) in the pin **1406**, as well as the trench **1419** in the first knuckle **1408**. In some implementations, the cap **1430** prevents the pin **1406** from pivoting relative to the first wing **1402**.

FIG. 15 illustrates a plan view (e.g., top view) of the hinge/hinge assembly of FIG. 14. As shown in FIG. 15, the hinge/hinge assembly **1400** includes a first wing **1402** and a second wing **1404**. The first wing **1402** is a door wing that is coupled to the second **1404** (which may be a frame wing) by a pin **1406**. A cap **1430** is coupled to the pin **1406**. The cap **1430** includes a protrusion **1432** that may be coupled to a trench/slot (not visible) in the pin **1406**, as well as the trench **1419** in the first knuckle **1408**. In some implementations, the cap **1430** prevents the pin **1406** from pivoting relative to the first wing **1402**.

The hinge/hinge assembly described in the present disclosure may be used in different window implementations, door implementations and/or configurations. FIG. 16 illustrates an example of a door that one or more of the hinge/hinge assembly described in the present application may be used. Specifically, FIG. 16 illustrates a configuration **1600** that includes a first door panel **1602**, a second door panel **1604**. The first door panel **1602** is coupled to a frame **1606** through a first hinge **1608** and a second hinge **1610**. The second door panel **1604** is coupled to the frame **1608** through a third hinge **1612** and a fourth hinge **1614**. In some implementations, the first, second, third and fourth hinges **1608-1614** may be any of the hinges described in the present disclosure. Different imple-

11

mentations may use different combination of hinges. Although FIG. 16 illustrates hinges being used in a door. In some implementations, the hinges in the present disclosure may also be used in windows.

While certain exemplary embodiments have been described and shown in the accompanying drawings, it is to be understood that such embodiments are merely illustrative of and not restrictive on the broad invention, and that this invention is not be limited to the specific constructions and arrangements shown and described, since various other modifications may occur to those ordinarily skilled in the art. For example, in some implementations, one or more of the knuckles of one or more wings may include a combination of holes and trenches/slots. Moreover, the use of the term “hole” should not be limited to a particular size and/or shape of a hole. A hole can be a cavity with any size and/or shape.

The invention claimed is:

1. A hinge comprising:

a first wing comprising:

a first knuckle comprising a first hole;

a second knuckle comprising a second hole and a first locking hole; and

a fifth knuckle comprising a fifth hole;

a second wing comprising:

a third knuckle comprising a third hole; and

a fourth knuckle comprising a fourth hole and a second locking hole;

a coupling pin configured to couple the first wing to the second wing through the first knuckle, the second knuckle, the third knuckle, and the fourth knuckle; and a locking pin configured to limit the hinge in a particular position when the locking pin is inserted into the first locking hole of the second knuckle.

2. The hinge of claim 1, wherein the locking pin is configured to lock the hinge in a particular position when the locking pin is inserted into the first locking hole of the second knuckle.

3. The hinge of claim 1, wherein the first wing is a door wing and the second wing is a frame wing.

4. The hinge of claim 1, wherein the coupling pin includes at least one locking hole.

5. The hinge of claim 1, wherein the locking pin comprises a first protrusion and a second protrusion, the first protrusion configured to be inserted in the first locking hole, the second protrusion configured to be inserted in the second locking hole.

6. The hinge of claim 1, wherein the locking pin is configured to limit the hinge in a second particular position when the locking pin is inserted into the second locking hole of the fourth knuckle.

7. The hinge of claim 1, wherein the locking pin is configured to lock the hinge in a second particular position when the locking pin is inserted into the second locking hole of the fourth knuckle.

8. The hinge of claim 1, wherein the first locking hole is at a first angle in the second knuckle, and the second locking hole is at a second angle in the fourth knuckle.

9. A hinge comprising:

a first wing comprising:

a first knuckle comprising a first hole and a first slot; and a second knuckle comprising a second hole and a second slot;

a second wing comprising:

a third knuckle comprising a third hole and a third slot; and

a fourth knuckle comprising a fourth hole;

12

a coupling pin configured to couple the first wing to the second wing through the first knuckle, the second knuckle, the third knuckle, and the fourth knuckle; and a locking slab configured to limit the hinge in a particular position when the locking slab is inserted into the first slot of the first knuckle.

10. The hinge of claim 9, wherein the locking slab is configured to lock the hinge in a particular position when the locking slab is inserted into the first slot of the first knuckle.

11. The hinge of claim 9, wherein the first wing is a door wing and the second wing is a frame wing.

12. The hinge of claim 9, wherein the locking slab is configured to lock the hinge in a particular position when the locking slab is inserted into the first slot, the second slot and the third slot.

13. The hinge of claim 9, wherein the locking slab is configured to limit the hinge in a second particular position when the locking slab is inserted into the second slot of the second knuckle.

14. The hinge of claim 9, wherein the locking slab is configured to lock the hinge in a second particular position when the locking slab is inserted into the second slot of the second knuckle.

15. The hinge of claim 9, wherein the locking slab is configured to lock the hinge in a particular position when the locking slab is inserted into the first slot of the first knuckle and the second slot of the second knuckle.

16. The hinge of claim 9, wherein the first slot is at a first angle in the first knuckle, and the second slot is at a second angle in the second knuckle.

17. The hinge of claim 9, wherein the locking slab is a magnetic slab.

18. A hinge comprising:

a first wing comprising:

a first knuckle comprising a first hole and a first slot; and

a second knuckle comprising a second hole;

a second wing comprising:

a third knuckle comprising a third hole; and

a fourth knuckle comprising a fourth hole;

a coupling pin comprising a pin slot, wherein the coupling pin is configured to couple the first wing to the second wing through the first knuckle, the second knuckle, the third knuckle, and the fourth knuckle; and

a locking slab configured to limit the hinge in a particular position when the locking slab is inserted into the first slot of the first knuckle and the pin slot of the coupling pin.

19. A hinge comprising:

a first wing comprising:

a first knuckle comprising a first hole and a first slot; and

a second knuckle comprising a second hole;

a second wing comprising:

a third knuckle comprising a third hole; and

a fourth knuckle comprising a fourth hole;

a coupling pin comprising at least one locking hole, wherein the coupling pin is configured to couple the first wing to the second wing through the first knuckle, the second knuckle, the third knuckle, and the fourth knuckle; and

a locking slab configured to limit the hinge in a particular position when the locking slab is inserted into the first slot of the first knuckle.